



FERA COLLABORATIVE INSIGHTS

A FOCUS ON FOOD
AUTHENTICITY AND
FRAUD OF EMERGING
NOVEL PROTEIN
SOURCES.

A response to Defra's
**Implications of Emerging
Novel Protein Sources
for Food Authenticity
and Labelling** report.

BY **ROSARIO ROMERO**
FERA SCIENCE LTD



Original thinking... applied



INTRODUCTION

Defra has recently published a report, commissioned to Fera Science Ltd, focussing on potential emerging risks regarding authenticity and labelling of alternative protein food products. Discussed in this report are aspects such as how these products may fit under the current regulatory labelling framework, how current testing capability can support product authentication and detection of emerging fraud risks and future research needs in this sector.

Following this publication, and to continue the debate into the current challenges and future opportunities within the industry, Fera is producing a series of articles culminating in a webinar, bringing together key industry stakeholders, researchers, and representatives from regulatory bodies.

Authored by Rosario Romero, Science Lead from Fera Science with input from several subject matter experts in this field, Defra's report has the potential to shape our understanding of and inform future authenticity method development needs to ensure testing capability for alternative proteins and future research needs are considered.



Rosario Romero
Science Lead, Novel Foods



[Click here to access the full report and delve deeper into its findings.](#)



REPORT OVERVIEW

Alternative sources of proteins are thought to have potential in helping to address challenges around food security and environmental impact of food production. The interest in alternative proteins has been increasing in recent years and this trend is expected to continue. Perceived benefits for animal welfare, health and sustainability are key drivers of this behaviour. There are still many challenges and research gaps in the sector, but innovations are progressing rapidly, and new products are becoming available to consumers.

Many of these new products will require pre-market regulatory approval, for which their nutritional properties and safety must be evidenced. Governments around the world are reviewing their regulatory frameworks to ensure that new products are accommodated whilst safeguarding industry and consumer's interests. With the introduction of novel ingredients and products and the increasing complexity of the food supply chain, there will be emerging risks that must be considered.

This report focuses on potential emerging risks regarding authenticity and labelling of alternative protein products, how these products may fit under the current regulatory framework for food labelling and how current testing capability can support product authentication and detection of emerging fraud risks in this sector.

The report synthesises and discusses findings from an international conference on alternative proteins, academic and grey literature, and expert consultations.



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CORE FINDINGS

Authenticity and Fraud

According to the sources consulted, little consideration has been given so far to potential food authenticity issues in the alternative protein sector, presumably because most efforts are currently focused on other aspects such as technology development, safety, scalability, etc. However, the developments in the field inevitably will carry associated risks of food fraud.

Beyond the usual drivers of food fraud, alternative proteins may have added vulnerabilities in relation to ingredient availability,

price of production, complexity of the supply chain, consumer acceptance or regulatory aspects.

Current analytical methods for food authentication will face issues such as a lack of genome data for novel species, the effect of novel processing techniques on biomolecules, identification of animal proteins produced by precision fermentation or identification of cell lines used for cultivated meat products.

Genomic information for the species used as sources of protein is required along with proteomics and metabolomics

databases and bioinformatics tools to support analytical methods. Spectroscopy techniques and orthogonal methods that integrate data from different technologies are regarded as powerful tools that will support verification of alternative protein products.

In addition to analytical methods, the wider food supply chain control systems must evolve to accommodate emerging complexities.

Areas identified as potentially promising to mitigate food fraud risks include



COMPUTATIONAL SOLUTIONS: BLOCK CHAIN, BIG DATA, ARTIFICIAL INTELLIGENCE



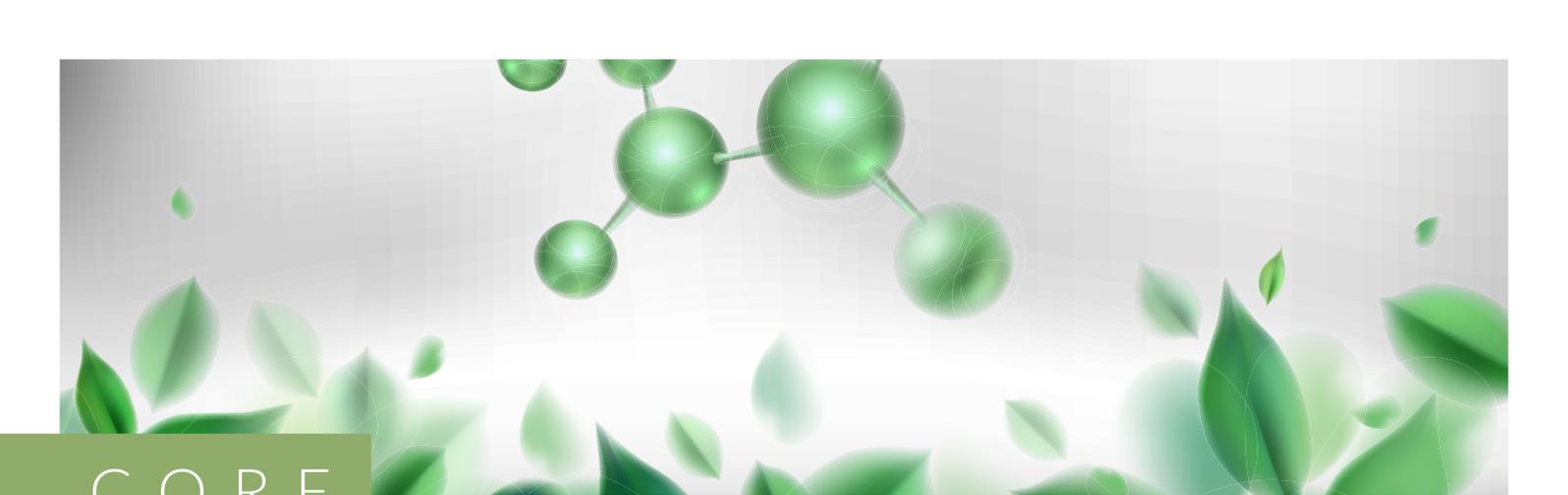
INTEGRATION OF COMPUTATIONAL TOOLS WITH ANALYTICAL TECHNOLOGIES SUCH AS SENSORS OR MOLECULAR MARKERS



STANDARDS AND CERTIFICATION SCHEMES



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CORE FINDINGS

Labelling of alternative proteins

There are two main points of debate around labelling of alternative proteins globally: (i) the concern about the use of descriptors traditionally used for animal-derived products to label and market substitutes made of non-animal protein, and (ii) the question of transparency about the methods of production.

Regarding names, as well as imagery used on labels, the regulations vary across countries and, with the fast development of novel products, the issue is a current topic of debate. In the UK, food information and labelling are governed by the Food Information to Consumers Regulation 1169/2011. This regulation outlines the general requirement for labelling to be clear, easy to understand, visible and not misleading as to the

characteristics and nature of the food. Additionally, the Common Market Organisation (CMO) regulations, retained from EU legislation dealing with sales descriptions for dairy, reserves the term milk, and various milk product terms exclusively for dairy. However, meat terms do not have the same degree of protection, and descriptors such as 'burger' or 'sausage', as well as related imagery are used in the alternative protein sector.

Regarding methods of production, in some cases, there may be a conflict between providing transparency and the technical complexities of the methods. Using terminology that is clear for consumers may be difficult, for example, there is debate about the most appropriate name for meat produced in vitro, as terms like

'cultured', 'cultivated', 'synthetic', 'lab-grown', etc, may be viewed by consumers as unclear or negative.

The evidence found during this project (stakeholder interviews, early consumer research found in literature, comments from conference) mostly supports the use of terms that refer to the format of the product (burger, sausage, etc) as long as the label clearly states the non-animal source, although further research into consumer perceptions of APs is needed to fully understand this emerging area.



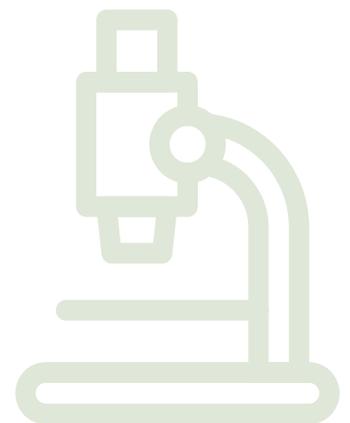
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CORE FINDINGS

Future research needs

- 1 Impact of new processing technologies on performance of existing authenticity tests.
- 2 Improve methods for detection of adulteration with nitrogen compounds
- 3 Support databases as tools for authenticity testing – genome, proteome, metabolome, spectral data, isotope ratios. Collaboration and data sharing are essential.
- 4 Investigate biomarkers to support authenticity testing of APs (plant-based, mycoproteins, precision fermentation).
- 5 Develop reference materials and validated methods to support testing of AP.
- 6 Engage with big data, artificial intelligence, block chain initiatives and research into application to food authenticity.
- 7 Identify and address points of vulnerability in the supply chain.
- 8 Analyse fraud in the AP sector to inform improvements to control and development of testing tools to support risk mitigation.



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CORE FINDINGS

Implications and Future Directions

The implications of this report are far-reaching. Its findings have the potential to catalyse innovative developments, offering fresh avenues for research, industry practices, and policy-making.

As we move forward, it is essential to consider the following:

1 It is important that labelling of novel food products provides clarity and helps consumers to make informed choices. Collaboration between industry and regulators is essential to achieve this.



3 Research is needed to identify and address points of vulnerability in the supply chain and analyse fraud in the ap sector.



This will inform improvements to control and development of testing tools to support risk mitigation.

2 R&D is required to develop analytical tools to support food authenticity of alternative proteins and novel foods.



Engagement with big data, artificial intelligence, block chain initiatives and their application to food authenticity are regarded as a promising avenue.

Conclusion

Alternative proteins are an emerging and very dynamic sector, and much of the efforts so far have been focused on identifying suitable sources and advancing the technologies. Therefore, there are still important research gaps, certainly regarding the topics of alternative proteins authenticity and related methodologies. This report provides an initial assessment of these issues, however, further research will be needed as the sector progresses, some of the emerging products become established and further data becomes available.



Click here to access the full report and delve deeper into its findings.